

## REMARKS

Claims 1-22 are pending in the present application. Claims 1-15 have been cancelled in accordance with a Response to Restriction Requirement filed August 30, 2002. Applicants reserve the right to prosecute non-elected Claims 1-15 in a divisional application. Claims 16, 19, and 21 have been amended. Claims 23-28 have been added. Support for the amendments and new claims are found in the Specification as filed at least in part on page 6, lines 22-24, page 6, line 26 to page 7, line 3, and page 7, lines 4-11. No new matter is added. The rejections are respectfully traversed in light of the following amendments and remarks, and reconsideration is requested.

### Claim Objections

Claims 19 and 21 are objected to under 37 C.F.R. 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claim 19 has been amended to depend upon Claim 16. Claim 21 has been amended to recite "aluminum contents of said first  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer and said second  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer are ranged from 10% to 100% by atomic composition." Accordingly, Applicants respectfully request reconsideration and withdrawal of the objections under 37 C.F.R. 1.75(c).

### Rejections Under 35 U.S.C. § 102

Claims 16-17 and 21 are rejected under 35 U.S.C. § 102(e) as being anticipated by Fafard et al. (U.S. Pat. No. 6,239,449 B1 hereinafter "Fafard"). In rejecting the claims, the Examiner writes in part that "Fafard teaches . . . a first undoped aluminum gallium arsenide layer as a blocking layer, el. 12, a quantum dot structure layer, el. 14, a second undoped aluminum gallium arsenide layer as a second buffer layer."

Fafard discloses a "photodetector will preferably have multiple layers of quantum dots, in which case a barrier 18 will separate the first quantum dot layer 14 from a second quantum dot layer 24." (Fafard, col.5, ll.1-4). Fafard continues, disclosing that "additional quantum dot layers and barriers can be added until the preferred number of quantum dot layers is reached, the quantum dot layers being separated by a barrier, giving a repeating sequence with a period d4." (Fafard, col.5, ll.13-17). Throughout the reference and in all the independent claims, Fafard discloses that quantum dot layers are separated from one another

by barrier layers (Fafard, col.9, ll.61-63; col.11, ll.10-12; col.12, ll.2-4), such as  $\text{Al}_{x5}\text{Ga}_{1-x5}\text{As}$  (Fafard, col.6, l.6). Thus, Fafard only discloses multiple quantum dot layers in conjunction with barrier layers (such as  $\text{Al}_{x5}\text{Ga}_{1-x5}\text{As}$ ) that separate each of the quantum dot layers.

Furthermore, Fafard discloses that in conjunction with multiple layers of quantum dots, the barrier layers "can be doped continuously or modulation doped . . . to provide carriers and for conductivity." (Fafard, col.5, ll.4-6; col.5, ll.19-21). Accordingly, Fafard does not disclose a quantum dot structure layer comprising a plurality of stacked layers formed between two undoped aluminum gallium arsenide ( $\text{Al}_x\text{Ga}_{1-x}\text{As}$ ) layers.

In contrast, amended Claim 16 recites, "a first undoped  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer as a blocking layer formed on said gallium arsenide layer; a quantum dot structure layer comprising a plurality of stacked layers formed on said first undoped  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer; a second undoped  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer as a second buffer layer formed on said quantum dot structure layer." Accordingly, because Fafard does not suggest or teach all the limitations of Claim 16, Claim 16 is patentable over Fafard.

Claims 17 and 21 depend upon Claim 16 and contain additional limitations that further distinguish them from the cited reference. Thus, Claims 17 and 21 are patentable over Fafard for at least the same reasons given above with respect to Claim 16.

#### Rejections Under 35 U.S.C. § 103

Claims 18-20 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fafard, as applied to Claims 16-17 and 21 above.

Claims 18-20 and 22 depend upon Claim 16 and contain additional limitations that further distinguish them from the cited reference. Thus, Claims 18-20 and 22 are patentable over Fafard for at least the same reasons given above with respect to Claim 16.

#### New Claims

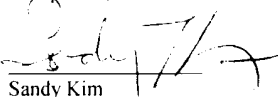
As noted above, the prior art does not disclose "a quantum dot structure layer comprising a plurality of stacked layers" formed between two "undoped aluminum gallium arsenide layers" as recited in Claim 23. Accordingly, Claim 23 is at least patentable over Fafard for similar reasons given above with respect to Claim 16.

Claims 24-28 depend upon Claim 23 and contain additional limitations that further distinguish them from the cited reference. Thus, Claims 24-28 are patentable over Fafard for at least the same reasons given above with respect to Claim 23.

### CONCLUSION

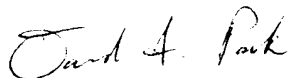
For the foregoing reasons, Applicants believe pending Claims 16-28 are allowable, and a notice of allowance is respectfully requested. If the Examiner has any questions regarding the application, the Examiner is invited to call the undersigned Attorney at (949) 752-7040.

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on April 10, 2003.

  
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Respectfully submitted,



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ATTACHMENT A

16. (Amended) A quantum dot infrared photodetector structure comprising:  
a gallium arsenide substrate;  
a first gallium arsenide layer as a first buffer layer formed on said gallium arsenide substrate;  
a first undoped [aluminum gallium arsenide]  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer as a blocking layer formed on said gallium arsenide layer;  
a quantum dot structure layer comprising a plurality of stacked layers formed on said first undoped [aluminum gallium arsenide]  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer;  
a second undoped [aluminum gallium arsenide]  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer as a second buffer layer formed on said quantum dot structure layer; and  
a second gallium arsenide layer as a contact layer formed on said second undoped [aluminum gallium arsenide]  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer.
19. (Amended) The structure according to claim [18] 16, wherein said quantum dot structure layer is made of one of silicon/silicon germanium composite and indium gallium arsenide/gallium arsenide composite.
21. (Amended) The structure according to claim 16, wherein aluminum contents of said first [aluminum gallium arsenide]  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer and said second [aluminum gallium arsenide]  $\text{Al}_x\text{Ga}_{1-x}\text{As}$  layer are ranged from 10% to 100% by [weight] atomic composition, respectively.